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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,202	12/10/2001	Christer Andersson	000500-326	2364

7590

06/25/2003

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EXAMINER

RO, BENTSU

ART UNIT PAPER NUMBER

2837

DATE MAILED: 06/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/006,202

Applicant(s)

ANDERSSON ET AL.

Examiner

Bentsu Ro

Art Unit

2837

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-12 is/are rejected.
- 7) ☒ Claim(s) 8 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

FIRST OFFICE ACTION

1. Applicant has submitted an IDS in paper #3, however, no PTO-1449 accompanied with this IDS. For time saving reason, the three references cited in paper #3 are incorporated into the PTO-892. Copies will not be provided.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-7 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Heikkila US Patent No. 5,371,458**.

Claims 1-10 read onto Heikkila's teaching as follows:

The claims:

1. A method for estimating a resistance in at least one phase winding in a reluctance machine, the method comprising:

receiving a signal indicating a voltage across the at least one phase winding;
receiving a signal indicating a current through at least one phase winding;

estimating a magnetic flux in response to the voltage signal and the current signal; and

Heikkila's teaching:

Heikkila teaches a flux and resistance estimating method for asynchronous machine, it is noted that the Heikkila's method is a general method and is applicable equally to all type of machine including a reluctance machine;

see column 1, lines 19-20, which states "*...when the current and voltage applied to the machine are known.*";
also see column 3, lines 11-12, which states "*...when the only measuring data are the stator voltage and stator current.*";

see column 1, equation (3) and Fig. 4, wherein the stator magnetic flux ψ_s is estimated based on the voltage signal u_s and the current signal i_s ;

estimating the resistance in the phase winding in accordance with a phase relation between the current signal and the magnetic flux estimate.

2. The method according to claim 1, further comprising:

adjusting the magnetic flux estimation using the estimated resistance.

3. The method according to claim 1, further comprising:

establishing a mutual position between a first and a second part of a reluctance machine in response to the current signal and the magnetic flux estimate.

4. The method according to claim 1, further comprising:

establishing a current reference value in response to a torque reference value and the magnetic flux estimate.

5. The method according to claim 1, wherein the resistance estimation further comprising:

determining a relation or a difference value between the magnetic flux estimate and the current signal; and

column 10, equations (55), (56) and (57) describe the resistance estimation R_{se} based on the current signal i_s and flux estimated signal ψ_{se} ;

it is very important to note that the current signal, voltage signal, and flux signal have phase relationship, see Figs. 1 and 2.

Heikkila teaches "iterative method" for the calculation until the desired result is converged;

equation (56) is a correction term (or an adjusting term).

Heikkila also teaches a method of solving equation (3) using multiple positions (or data points) and average signal as shown in Figs. 1 and 2.

See column 1, equation (1).

equation (3) shows a relation between the magnetic flux and the current signal; equation (56) shows a difference value between the magnetic flux estimate and the current signal;

adjusting the estimated resistance depending on the difference value or the relationship value.

6. The method according to claim 5, wherein the adjustment of the estimated resistance influences a subsequently produced magnetic flux estimates so that the absolute value of the difference value is minimized.

7. The method according to claim 5, wherein the adjustment of the estimated resistance comprises:
increasing the estimated resistance when the difference value has a first sign and reducing the estimated resistance when the difference value has a second sign.

9. (And similar claim 10) The method according to claim 1 further comprising:
generating a winding temperature value on a basis of said estimated resistance.

equation (57) adjusts the resistance value based on the difference value.

The iterative method of calculation is to minimize the error or the difference value; it is noted that for each step of iteration, the error signal decreases, if the process repeats several times, the final value will converge to a constant value and the difference value will minimize to almost zero.

One of the well known iterative method is the Newton's Method in that the iterative value tends to decrease in the first iteration and then increase in the second iteration, however, the difference (or error) reduces each time.

Column 10, lines 67-68 clearly identifies the variation of resistance by the variation of temperature, therefore, if the resistance value is known, the winding temperature can be estimated.

Regarding claims 11 and 12, to implement Heikkila's machine, at least a microprocessor is required because a whole sequence of computation is required. The microprocessor must include memory to store the first iteration values (current, voltage, flux, resistance, etc.). The microprocessor must also include memory to store programs.

4. Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
6. Any inquiry concerning this communication should be directed to Bentsu Ro at telephone number 703 308-3656.

June 20, 2003


Bentsu Ro
Primary Examiner